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Roselliniella stereocaulorum (*Sordariales*, *Ascomycota*), a new lichenicolous fungus from the Holarctic

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Abstract — *Roselliniella stereocaulorum* growing on *Stereocaulon* spp. is described as new from Poland, the Asiatic part of Russia and the USA (Alaska).

Key words — taxonomy, new species

Introduction

Roselliniella Vain. (*Sordariales*, *Ascomycota*) is an obligate lichenicolous pyrenomycetous genus that included 15 species. It is characterized mainly by non-amyloid, up to 8-spored asci without distinct apical structures, brown, simple or very rarely septate ascospores with smooth or microguttulate (not verruculose) walls lacking visible pores, and brown, commonly distinct vegetative hyphae penetrating usually only the host tissues, but sometimes also surrounding perithecia (Matzer & Hafellner 1990, Aptroot et al. 1997, Hawksworth & Miądlikowska 1997, Hoffmann & Hafellner 2000, Etayo 2002, Etayo & Sancho 2008). Members of the genus grow mainly on various foliose, fruticose and occasionally also crustose lichens of two orders, *Lecanorales* and *Peltigerales* (Matzer & Hafellner 1990, Aptroot et al. 1997, Hawksworth & Miądlikowska 1997, Etayo 2002), with the exception of *R. microthelia* (Wallr.) Nik. Hoffm. & Hafellner. This species is confined to the genus *Trapelia* M. Choisy (Hoffmann & Hafellner 2000), a member of *Baeomycetales* (classification according to Lumbsch & Huhndorf 2007, Lumbsch et al. 2007).

During the studies on lichenicolous fungi in the Holarctic and a revision of the genus *Stereocaulon* in Poland, we found interesting specimens of *Roselliniella* with predominantly 4-spored asci. It is the first record of a *Roselliniella* growing

on the *Stereocaulaceae* (order *Lecanorales*), and closer examination revealed it represents a so far unknown species. The aim of this paper is to describe the new taxon.

Material and methods

The material was examined by standard microscopic techniques using LOMO microscopes MBS-1, Mikromed-2 and Zeiss microscope Axio Imager A1 equipped with Nomarski differential interference contrast optics. Photographs were taken by AxioCamMR5 cameras. Microscopical measurements were made in water. Color reactions were examined in 10 % KOH (K), 1 % Lugol's iodine solution, directly (I) or after KOH pre-treatment (K/I). The length, breadth and length/breadth ratio (l/b) of asci and ascospores are given as: (min.–){X–SD}–X–{X+SD}(–max.), where min. and max. represent the extreme values, X the arithmetic mean, and SD the standard deviation. The measurements of asci were rounded to the nearest 1 µm, whereas those of the ascospores to the nearest 0.5 µm. Examined specimens are deposited in KTC, LE and UGDA.

Results and discussion

Roselliniella stereocaulorum Zhurb., Kukwa & Oset, **sp. nov.** Plate 1

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Fungus lichenicola in thallis lichenum generis Stereocaulon parasiticus. Similis Rosselliniellae cladoniae, *sed ascis imprimis 4-sporis, ascosporis levibus, semper non septatis et hospite diverso differt.*

Typus: USA. Alaska, Great Kobuk Sand Dunes, Ahnewetut Creek, 67°02'N, 158°50'W, alt. 50 m, open lichen heath among sparse *Picea glauca* forest, on *Stereocaulon alpestre* (stems, phyllocladia), 1.VIII.2000, M. Zhurbenko 0045 (LE –210332–**holotypus**).

Etymology: The name refers to the host genus.

Description: Vegetative hyphae immersed in the substrate, abundant, flexuose, scarcely branched, smooth-walled, evenly medium brown, septate, of cells 15–30 × 2–5 µm; ascomata perithecioid, dispersed, pyriform, ovate, occasionally subglobose or narrowly ovate, ostiolate, infrequently with a distinct neck, black, rarely with a brown tint, matt, rough, 0.2–0.4 mm wide, 0.3–0.5 mm high, ¾ immersed in host tissues to sessile, occasionally almost completely hidden in host's tomentum, occasionally attached laterally, sometimes covered by conspicuous dark hairs, particularly in the lower part; hairs more or less straight, unbranched, smooth-walled, evenly medium brown, septate, cells 10–45 × 3.5–5 µm; peridium brown throughout, paler towards the centre, 20–30 µm thick in lower part, 30–60 µm in upper part, in surface view of textura angularis, with cells 5–10 µm in diam., in cross section composed of 5–10 cell layers, with isodiametric outer cells and elongate inner cells, K–; ostiolar filaments abundant, 1–2 µm wide; hymenium hyaline, I–, K/I–; interascal

FILAMENTS long, scarcely septate and branched, with numerous guttules, sometimes slightly moniliform, not thickened at the apex, 1–5 µm wide; ASCI unitunicate, with 4 mature spores, but sometimes with 8 spore initials, cylindrical to slightly ventricose or slightly clavate, with long foot and often rather acute apex, without apical structures, (80–)91–104–117(–130) × (10–)11–15–19(–25) µm (n = 22), I–, K/I–; ASCOSPORES uniseriate, often inclined and partly overlapping in the ascus, unicellular, elliptic, occasionally broadly or narrowly elliptic, rarely circular, lemon-shaped or narrowly ovate, at first colorless, then medium brown and K+ olive, usually with numerous small and 1(–3) large guttules, without visible perispore, (14–)20–23–26.5(–35) × (10–)11.5–13–14.5(–18.5) µm, l/b = (1–)1.5–1.8–2.1(–2.8) (n = 205); ASCOSPORE WALL smooth, scaling off when old (often by longitudinal split), 0.5–0.8 µm thick; ASCOSPORE APICES rounded or sometimes acute, occasionally with nodules (beaks) 1–1.5 µm across on both or one of the apices; CONIDIOMATA not observed.

HOSTS AND BIOLOGY — The species was found on stems and phyllocladia of *Stereocaulon alpestre*, *S. alpinum*, *S. condensatum*, *S. glareosum,* and *S. rivulorum*. No damage to the host was observed. So far *Roselliniella stereocaulorum* has been found within deciduous (Poland) or coniferous (Asia and North America) forest zones.

DISTRIBUTION — So far it has been known in 6 localities in Europe (Poland), Asiatic part of Russia (Baikal Siberia and Yakutiya) and North America (Alaska).

COMMENTS — The new species is best positioned within the genus *Roselliniella*, since it has dispersed perithecia with free brown hyphae, branched interascal filaments, 4-spored asci without distinct apical structures, and brown, simple and smooth-walled ascospores lacking germ pores. However, apical nodules found on a part of ascospores of *R. stereocaulorum* have never been seen before in any other member of the genus; the taxonomic importance of this structure can not be settled out at present. Some characters of the new species also fit the generic concepts of *Reconditella* Matzer & Hafellner, *Roselliniomyces* Matzer & Hafellner and *Roselliniopsis* Matzer & Hafellner (Matzer & Hafellner 1990, Hafellner 2004). However, *Reconditella* differs in mature ascomata lacking free hairs, 5–8-spored asci, and verruculose ascospores with a grey tint, *Roselliniomyces* has unbranched interascal filaments and verruculose ascospores, and *Roselliniopsis* has usually aggregated ascomata embedded in a subiculum and dark ascospores possessing germ pores. Apical nodules found on the ascospores of *Roselliniella stereocaulorum* may resemble germ pores of *Roselliniopsis* (as is depicted e.g. for *Roselliniopsis groedensis* in Kocourková 2000, plate 5, fig. 4), however, true germ pores of *Roselliniopsis* are often asymmetric and easily visible (J. Hafellner, pers. comm.).

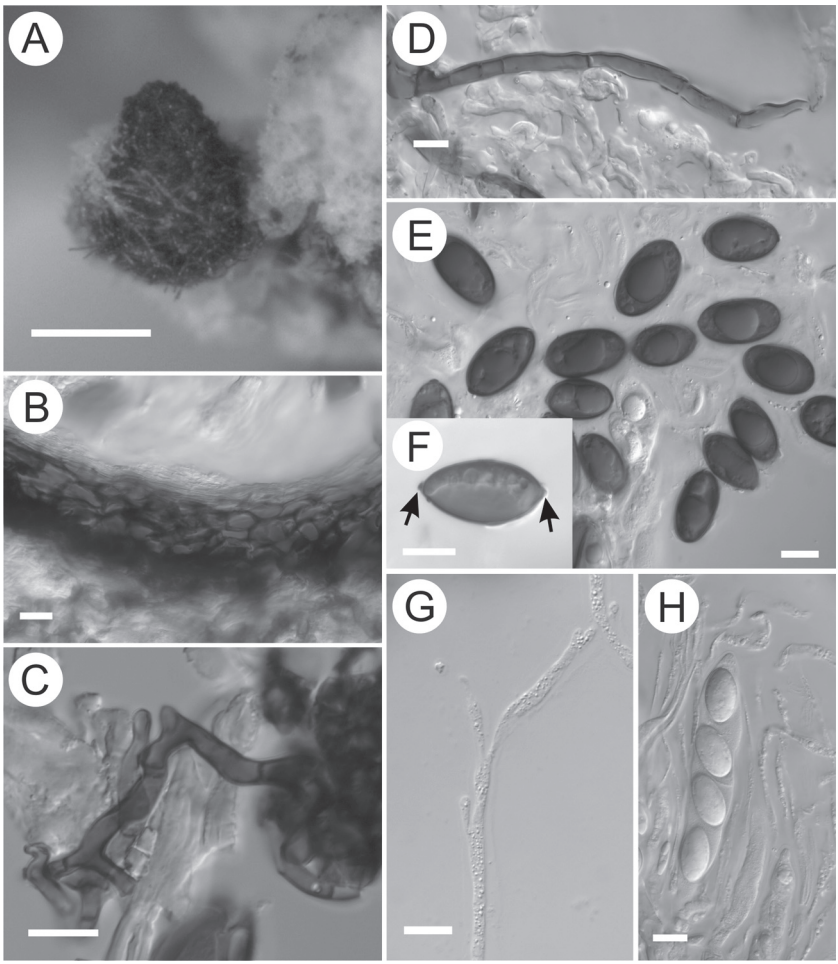

Plate 1. *Roselliniella stereocaulorum*. A: hairy perithecium (from the holotype; scale 200 μm); B: cross section of basal perithecium wall (from LE–207727; scale 10 μm); C: vegetative hyphae (from holotype; scale 10 μm); D: ascomatal hair (from the holotype; scale 10 μm); E: ascospores (from LE–210462; scale 10 μm); F: ascospore with distinct apical nodules (arrows) (from LE–207727; scale 10 μm); G: branched interascal filament (from the holotype; scale 5 μm); H: immature ascus and interascal filaments (LE–207655; scale 10 μm).

Amongst 15 so far known *Roselliniella* species, *R. stereocaulorum* is most similar to *R. cladoniae* (Anzi) Matzer & Hafellner. The latter species differs in larger (0.15–0.7 mm wide, 0.2–0.7 mm high) perithecia, ascospores with often microguttulate surface, which can reach 52 μm in length and are occasionally

septate, (1–)2–8-spored asci and a different host genus (*Cladonia*; Matzer & Hafellner 1990).

Only two other *Roselliniella* species, *R. nephromatis* (P. Crouan & H. Crouan) Matzer & Hafellner and *R. stictae* Etayo, typically have 4-spored asci (Matzer & Hafellner 1990, Etayo, 2002). When compared with *R. stereocaulorum*, *R. nephromatis* has larger perithecia (0.4–0.7 mm wide, 0.45–0.7 mm high), slightly more elongate (arithmetic mean of length/breadth ratio: 2) and narrower [(6–) 8–11–13(–15) μm wide] ascospores with microguttulate walls, and grows on *Nephroma* species (Matzer & Hafellner 1990). *R. stictae* differs predominantly in much smaller (11–15 × 6.5–8 μm) ascospores and *Sticta* as the host genus (Etayo 2002).

Specimens examined—**POLAND**. **Kotlina Biebrzańska basin.** Dolina Biebrzy valley, ca. 10–11 km SSE of Grajewo town, by the railway Grajewo-Białystok, the edge of pine forest, on *Stereocaulon condensatum* growing on soil—25.09.1986, S. Cieśliński (KTC, UGDA). **RUSSIA. Baikal Siberia.** 2 km SE of Anchuk, Bol'shaya Bystraya River, 51°44'N, 103°29'E, alt. 700 m, mixed forest, by the river bank, on *S. glareosum*—09.06.2005, M. Zhurbenko 0553 (LE–233667); N slope of Khamar-Daban Range, Anosovka River, 51°30'N, 105°07'E, open pebble site by the river bank, on *S. rivulorum*—24 IX 1996, I. Urbanavichene (LE–207655); **Yakutiya.** Oimyakon District, Indigirka River downstream of Predporozhnyi, 65°03'N, 143°09'E, alt. 450 m, on *S. condensatum*—15.07.1992, M. Zhurbenko 92508:a (LE–207727:a). **USA. Alaska.** Great Kobuk Sand Dunes, 67°06'N, 159°01'W, alt. 50 m, on *S. alpinum*—11 VIII 2000, M. Zhurbenko 00111 (LE–210462).

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